A few Facts relative to the Colouring Matters of some Vegetables. By James Smithson, *Esq. F.R.S.* Read December 18, 1817. [*Phil. Trans.* 1818, *p.* 110.]

The author offers the scattered facts contained in this paper to the notice of the Society, in the hope that they may induce some other person to extend the experiments, interesting not merely in chemistry but also in the art of dyeing.

The author observes that Fourcroy's opinion,—that turnsole is red originally, and made blue by carbonate of soda,—is erroneous, for its tinctures contain no alkali of any kind; he found in it a small portion of carbonate of lime. The insoluble part of turnsole is rendered red by acids, but not affected by carbonate of soda; when burned, a portion of smalt remains. The soluble part was obtained by evaporating its aqueous solution. When burned it leaves a little potash, which the author thinks essential to its composition, and that, like ulmin, it may be a compound of a vegetable principle with potash. The next colouring principle noticed by the author is that of the violet, it is reddened by acids, and becomes first green and then yellow by the alkalies and the carbonates. A similar principle exists in the petals of the red rose, of red clover, of the tips of the daisy, in the blue hyacinth, hollyhock and lavender, in the inner leaves of the artichoke, in the skin of plums, and in several other vegetable substances, also in the red cabbage. To this principle the author applies the name of Ajax, whose blood is fabled to have dyed the violet.

In sugar-loaf paper the author found two colouring matters: one red, and soluble in water; the other blue, and requiring an acid for its extraction.

The juice of the black mulberry is rendered green by caustic potash, blue by carbonate of soda, and vinous red by carbonate of ammonia. When mixed with chalk it rendered that substance blue, and the filtered liquor was red, and could not be made blue by further addition of the chalk. Heat did not affect the red colour of this liquid. If the red and the blue matter contained in the mulberry be considered as distinct principles, the author proposes to call the former Pyramus, the latter Thisbe.

The colouring matter of the corn-poppy is scarcely altered by carbonate of soda. Caustic potash makes it green, and caustic ammonia produces no effect. Muriatic acid renders the infusion of the poppy petals florid red, which is rendered dark red by carbonate of lime. These and other experiments induce Mr. Smithson to regard the colour of the corn-poppy as analogous to the red principle of the mulberry.

The pigment called sap green is the inspissated juice of the buckthorn berries. It is rendered yellow by carbonate of soda and caustic potash. Its solution is reddened by acids, and the green is restored by chalk. To this substance, and to the common green matter of vegetables, the author assigns the name Chloris.

The colour of some green insects is not altered either by muriatic acid or carbonate of soda, and therefore appears to be a peculiar principle differing from that of vegetables.

Account of Experiments made on the Strength of Materials. By George Rennie, *jun. Esq. In a Letter to* Thomas Young, *M.D. For. Sec. R.S.* Read February 12, 1818. [*Phil. Trans.* 1818, *p.* 118.]

After taking a cursory view of the labours of others in this department of mechanical inquiry, Mr. Rennie proceeds to give an account of the apparatus which he employed, and of the result of his own experiments. Of the resistances opposed to the simple strains which may disturb the quiescent state of a body, the principal are: the repulsive force, whereby it resists compression; and the force of cohesion, whereby it resists extension. On the former, with few exceptions, there is scarcely anything on record. Lagrange, in his Memoir on the Force of Springs, published in 1760, represents the moment of elasticity by a constant quantity, without indicating the relation of this value to the size of the spring: but in the Memoir of 1770, on the Forms of Columns, when he considers a body whose dimensions and thickness are variable, he makes the moment of elasticity proportional to the fourth power of the radius:—but all these calculations, says Mr. Rennie, are inapplicable to columns under common circumstances. The results of experiments are also extremely discordant; for it is deduced from those of Reynolds, that the power required to crush a cubic quarter of an inch of cast iron is 200 tons, whereas in the author's experiments upon cubes of the same size, the amount never exceeded five tons; and although Mr. Reynolds probably employed metal cast at the furnace of Maidley Wood, which is very strong, yet this circumstance can have been but of little importance compared with the great disproportion of results.

Mr. Rennie employed four kinds of iron: the first taken from the centre of a large block, similar in appearance to what is usually called gun metal; the second from a small casting, close-grained, and of a dull gray colour; the third, horizontally cast iron, in bars three eighths of an inch square and eight inches long; the fourth, similar bars cast vertically. It appears from the annexed tables that the vertical castings are stronger than those taken from the block.

Some miscellaneous experiments relating to the different kinds of wood and stone are also added to those on the metals. They show that little dependence can be placed on the specific gravity of the stone; neither is hardness to be regarded as a characteristic of strength. In the rupture of amorphous stones, Mr. Rennie remarks, that pyramids are formed, having for their base the upper side of the cube next the lever, the action of which displaces the sides of the cubes precisely as if a wedge had operated between them.